

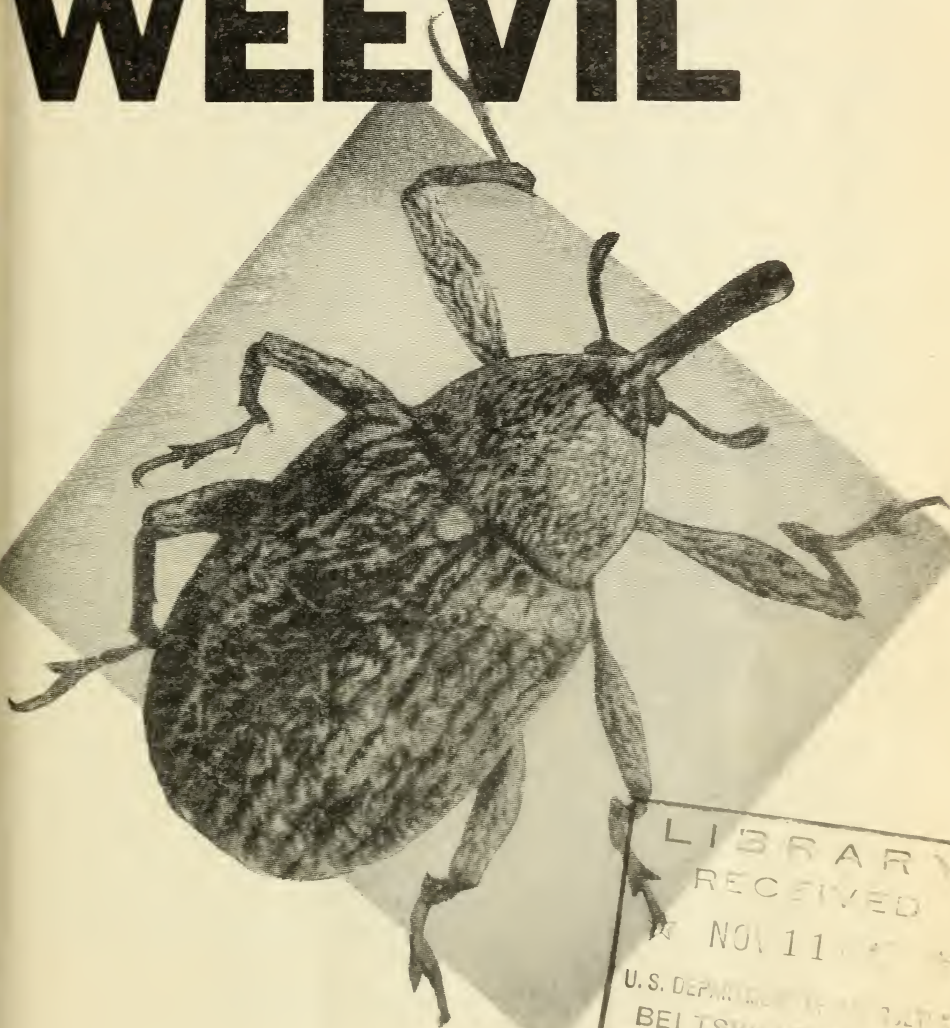
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# **THE PEPPER WEEVIL**



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**U. S. DEPARTMENT OF AGRICULTURE**

## THE PEPPER WEEVIL

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VEGETABLE growers in California, Arizona, New Mexico, Texas, and Florida who find small white grubs in fallen pods or even in the blossom buds of peppers (fig. 1) are justified in blaming the pepper weevil (*Anthonomus eugeni* Cano) for the damage. Tiny holes in the pepper pods (fig. 2, *A*) and the black and decayed condition of the seeds and the pulp around the seeds (fig. 2, *B*) are further evidence that the pepper weevil is damaging the crop.

The pepper weevil is the most important insect pest of peppers wherever it occurs in the United States and, unless controlled, it causes serious losses amounting to 50 percent of the crop in some years. Peppers constitute an important item in our food requirements, since they contain several of the vitamins and minerals, as well as producing an alkaline reaction. During 1941 approximately 35,000 acres of peppers were grown in the United States, having a total estimated value of approximately \$4,250,000.

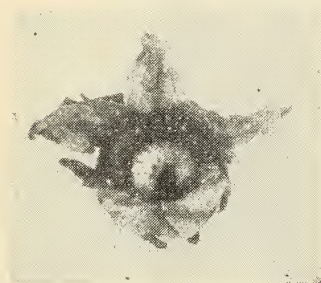


FIGURE 1.—Small grub of pepper weevil in blossom bud of pepper. About 3 times natural size.

Damage is done to peppers by the larva and by the adult weevil. Early in the season, before pods have formed, the female weevil lays her eggs in the blossom buds, but later she also attacks the young pods in a similar manner. Feeding by the grub is confined to a single blossom bud (fig. 1) or pod. While the grub may be in the wall of the pod, it is more often

### What the Pepper Weevil Looks Like

The larva, or grub, of the pepper weevil (fig. 3, *O*) is legless and white, although it appears gray when the digestive tract is filled. It has a pale-

brown head and is about one-fourth of an inch long. The pupa, or resting form (fig. 3, *D* and *E*), which is white and slightly smaller than the larva, is not able to move about or feed. It can be distinguished from the larva by its partly developed snout, legs, and wings, which are folded around the body. The adult weevil (fig. 3, *A* and *B*) is about two- to three-sixteenths of an inch long, is black, and is sparsely covered with gray or yellowish hairs, and its mouth parts are found at the end of a snout which is smooth and about half the length of the body.

### How the Weevil Damages Peppers

Damage is done to peppers by the larva and by the adult weevil. Early in the season, before pods have formed, the female weevil lays her eggs in the blossom buds, but later she also attacks the young pods in a similar manner.

Feeding by the grub is confined to a single blossom bud (fig. 1) or pod. While the grub may be in the wall of the pod, it is more often

found in the seed and seed core (fig. 4). The injury from feeding by the grub causes the blossom buds or peppers to fall to the ground or to be malformed or discolored.



FIGURE 2.—Pepper pods injured by pepper weevil: *A*, Pods showing holes made by pepper weevil adult in emerging from pods; *B*, pepper pods cut open to show the black and decayed condition of the seed and the pulp around the seed caused by the feeding of the pepper weevil grub.

The adult weevil feeds upon the foliage, blossom buds, and tender pods. Although there can be considerable damage from the feeding holes made by the weevil, it is never so severe as that caused by the grubs.

## How the Pepper Weevil Lives

### Food Plants

The pepper weevil lives on a few plants other than pepper belonging to the nightshade family. In California it spends the winter and spring on wild nightshade (*Solanum* spp.), as well as on old pepper plants, and is able to pass through its life stages in nightshade berries. In the absence of nightshade and peppers it may live on eggplants and occasionally on potato foliage.

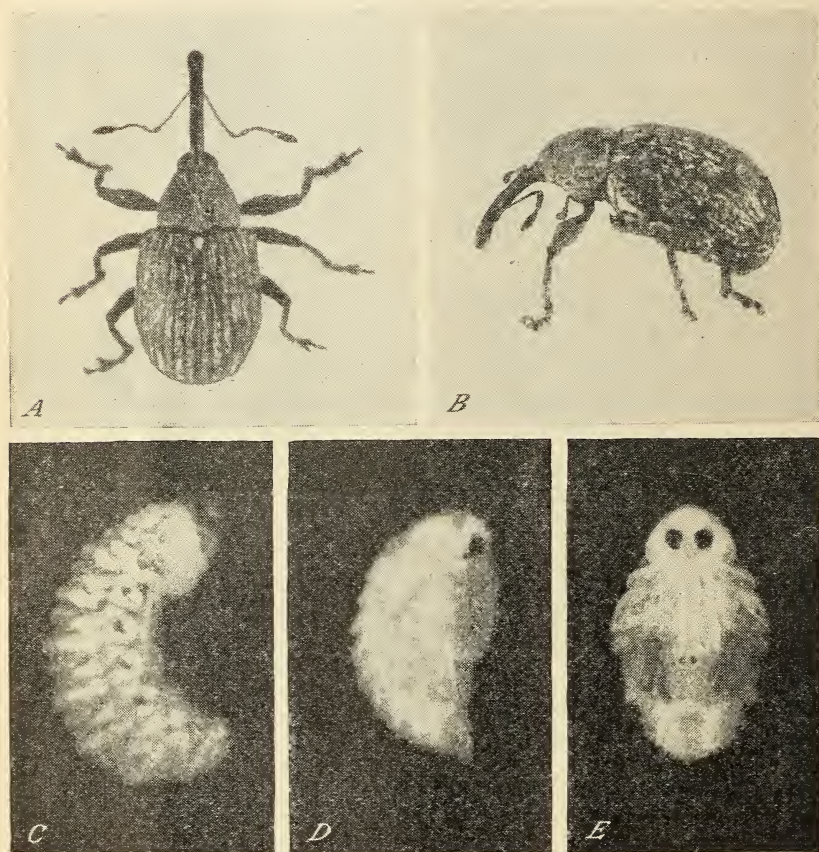


FIGURE 3.—A, Adult, or parent weevil of the pepper weevil, viewed from above; B, the same, viewed from the side; C, larva, or grub, of the pepper weevil; D, pupa, or resting form, viewed from the side; E, the same, viewed from below. All stages approximately 9 times natural size.

### Life Stages

The female adult, or parent pepper weevil (fig. 3, A and B), lays her eggs in small holes which she punctures in the blossom buds or in immature pods of the pepper. In 3 or 4 days the eggs hatch, and the small grubs (fig. 3, C) feed and grow on the inside of the buds or among the seeds of the immature pods. The grubs reach maturity

in 8 to 10 days and then change to pupae (fig. 3, *D* and *E*). After about 4 to 6 days the pupae change to adults. The adults make round holes through the rind of the pods, and through these they crawl to the outside, ready to lay eggs for another generation.

Complete development from egg to adult occurs within the blossom buds or within the immature peppers, depending on where the eggs are laid. The weevil may have from five to eight generations a year, depending on the favorableness of certain weather conditions. During cool weather the weevil may require 5 or 6 weeks to develop from egg to adult, but in warm weather it may need only 2 or 3 weeks.

#### Seasonal Activity

In California the pepper weevils do not hibernate during the winter, as many other insects do, but stay on green pepper plants that may survive or on nightshade or other host plants. On cold days they crawl to the dead leaves at the base of the host plant for protection, but on warm days they crawl back up the plant to feed. As they cannot live long on other plants, weevils die rapidly when host plants are removed.

Early in the spring the weevils are found on wild nightshade or on old pepper plants surviving from a previous crop. One or two generations may develop in the berries of the nightshade or in the blossom buds of the old pepper plants before the plants of the new crop are large enough to be attacked.

In June, as the plants begin to set blossom buds, the weevils fly to the new fields of pepper. Here they reproduce rapidly and soon become numerous enough to destroy most of the pods.

In the fall many of the weevils migrate to and concentrate upon nightshade plants, while others remain throughout the winter on the old pepper plants. Unfavorable weather or a scarcity of food during the winter may severely reduce the numbers of weevils surviving until spring. When this reduction is great enough, large numbers of pods of the new crop will mature before the weevils can destroy them.

#### How to Combat the Pepper Weevil

Although the following recommendations for the control of the pepper weevil were worked out in California, the chemical control methods are suitable for any other areas infested by this weevil, such as Arizona, New Mexico, Texas, or wherever insecticidal treatment for this pest may be needed.

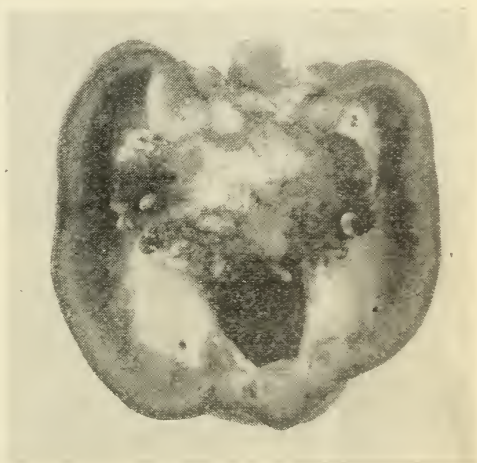


FIGURE 4.—Pepper pod cut open to show the pepper weevil grubs feeding in the seed and seed core.

### Poisons and How to Use Them

The pepper weevil may be controlled by dusting the plants at weekly intervals with a dust mixture of cryolite containing 50 percent of sodium fluoaluminat ( $\text{Na}_3\text{AlF}_6$ ). In cases of heavy weevil infestation, however, the first three applications should be made at 5-day intervals.

When the plants are small, applications of the dust mixture should be made at the rate of 15 pounds per acre, but as the plants grow larger the quantity should be gradually increased to about 25 pounds per acre. In localities where the pepper weevil has been known to cause damage, the first application should be made when the pods are beginning to set, and treatment should continue until seven or eight applications have been made, or until most of the pods have matured.

Immature pods which were infested before the poison was applied will drop from the plant. Therefore it is important to watch the field carefully so as to detect the earliest injury and then to apply the poison dust mixture early enough to prevent unnecessary infestation and falling of peppers.

In localities where the pepper weevil has not caused damage before, or during seasons of late weevil infestation, dusting should begin when the weevils are first found in the field. Four or five applications will control light infestations, or infestations which begin late in the season, but as many as eight applications may be required to control early and heavy infestations.

Dust applications should be made when the wind is not blowing. The best time for dusting is usually at night or early in the morning. Whether hand-operated dusters or power dusters are used, the nozzles should be carried at a level 6 to 8 inches above the plants so that the dust strikes the plants from above (figs. 5 and 6). This is important, because the weevils attack the blossom buds and young pods which continue to set on the new branches of the plant.

NOTE.—The use of insecticidal dusts on peppers may cause large numbers of aphids, or plant lice, to develop on the plants, especially when weather conditions are favorable to the aphids early in the season. If aphid infestations develop to a point where serious damage is likely to occur, they should be controlled by the use of a dust mixture containing 3 percent of nicotine.

**WARNING:** The application of cryolite to peppers will leave on the pods a poisonous residue, which must be removed before the peppers are dried or are offered for sale. Furthermore, this poison should not be used on chili peppers that are to be dried, unless tested or approved washing equipment is available for removing the poison before drying. Experience has shown that pepper washing should include agitation for 1 minute in a 2-percent solution of hydrochloric acid heated to 100° F. Thorough rinsing in fresh water should follow the acid bath. As a further precaution, samples of the pods should be chemically analyzed frequently during the washing process to make sure that the poison is being successfully removed.

#### How To Prepare the Cryolite Dust Mixture

To prepare 100 pounds of the recommended cryolite dust mixture containing approximately 50 percent of sodium fluoaluminat, use the following formula:

Cryolite (containing 85 percent of sodium fluoaluminat).	59 pounds (approximately 6 parts by weight).
Talc.....	41 pounds (approximately 4 parts by weight).





FIGURE 5.—Dusting peppers with a hand duster to control the pepper weevil.



FIGURE 6.—Dusting peppers with a power duster to control the pepper weevil.

If the percentage of sodium fluoaluminat in the stock material is substantially different from that given in the above formula, the number of pounds of the stock material to be used in preparing the dust mixture can be calculated as follows: Divide the percentage required in the finished dust mixture by the percentage in the stock material and multiply by 100. This number of pounds of stock material should then be subtracted from 100 to obtain the number of pounds of talc or other similar diluent to be used.

If the cryolite dust mixture recommended for the control of the pepper weevil cannot be obtained, calcium arsenate, undiluted and applied in the same manner and at the same dosage recommended for the cryolite dust, may be substituted. Since the use of calcium arsenate usually leads to the development of a serious infestation of aphids, however, the cryolite dust mixture is preferred.

### Cultural Practices

Destroy old pepper plants by thoroughly disking or plowing the field as soon as the pepper crop has been harvested.

Locate and destroy nightshade plants growing near the old pepper field so that the overwintering weevils will starve before the next crop of peppers is available for food. Do this not later than January 15 under California conditions and in other areas not later than winter or early spring.

Plant peppers early so that many of the pods will mature before the pepper weevils become numerous enough to destroy them.

Use seed of varieties known to produce early pods. Mature pods, which have become smoother and harder than the immature ones, cannot be punctured by the weevils.

Pick up and destroy the infested pods by burying or burning them as soon as they fall. This will destroy the weevils that would otherwise come out and lay eggs.

### Where To Get Insecticides

Information regarding the purchase of the insecticide materials mentioned in this leaflet may be obtained through local dealers in agricultural supplies, seedsmen, general stores, and drug stores or through the county agricultural agent, State agricultural experiment station, State department of agriculture, or the Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

### Precautions

In handling, mixing, and applying poisonous insecticides, take special care not to inhale excessive quantities at any time. Well-designed respirators that afford protection to the entire face are available and should be used when such danger exists. After working with insecticides, wash the hands or any exposed parts of the body thoroughly.





